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ABSTRACT

This paper examines Alabama's State Education Report Card for the year 2000. It identifies predictors for student academic achievement at both the district and school levels for 128 public school systems and 1,272 public schools. Separate analyses were conducted for 61 city and 67 county school systems. The variables included number of students, percent of students on free and reduced-price meals, average daily attendance, per-pupil expenditure, drop-out percentages, school-system revenue sources, and percent of system and school employees with bachelor's degrees, master's degrees, or 6-year doctoral administrative licensure. Findings show that significant differences exist between city and county school districts. Some of the disparities between city and county school districts may have been the result of differences in allocation of funds and in participation in programs that are specific to the needs of city or county school districts. The percent of students at the poverty level had a negative effect on achievement at both district and school levels. Student achievement levels were positively affected by postbaccalaureate faculty education, ample funding from local revenue sources, and high attendance. The negative correlation between student achievement and the percent of teachers with bachelor's degrees suggests the need for both continuing professional development for experienced teachers and internships for beginning teachers. (Contains 25 references and 11 tables.) (RJM)

ED 455 575

ALABAMA'S EDUCATION REPORT CARD 2000: SIGNIFICANT PREDICTORS OF STUDENT ACHIEVEMENT AT THE DISTRICT AND SCHOOL LEVEL

Research Brief R-01-AL00

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Alabama's Education Report Card 2000: Significant Predictors of Student Achievement at the School District and School Level

Abstract

The study examined Alabama State Education Report Card indicators for the year 2000 to identify predictors for student academic achievement at both the district and school level for 128 public city and county school systems and 1272 Alabama public schools. School district performance grade and school performance grade as provided on the Alabama Education Report Card for 2000 were used as the dependent variables for district and school academic achievement.

Separate analyses were conducted for 61 city and 67 county school systems and for all 128 districts combined. Variables were number of students (district and school enrollment), percent of students on free and reduced price meals, percent average daily attendance, per pupil expenditure, dropout percentages from the 1999 report card, school system revenue sources, and percent of system and school employees with bachelor's, master's, or 6 year doctoral administrative licensure. The results of t-tests indicated significant differences between city and county school systems on variables in the analysis. Several models were regressed on student achievement measured by system academic performance grade, resulting in $\underline{R}$s ranging from .76 to .81 and adjusted $\underline{R}^2$s from .57 to .64. System size, percent funding from local revenue, and percent of administrators holding 6 year doctoral administrative licensure were significant predictors of a higher school district performance grade after controlling for poverty.

At the school level, variables in the regression models yielded $\underline{R}$s between .62 and .67, with adjusted $\underline{R}^2$ between .39 and .45. At the school level the most significant predictors of higher performance grade after controlling for poverty were percent average daily attendance, school size, and percent of teachers with masters' degrees.

Alabama's Education Report Card 2000: Significant Predictors of Student Achievement at the District and School Level

Review of Related Literature

There have been many studies of state education report cards conducted over the years from a variety of different perspectives, often connected to court cases involving funding equity between poor and wealthy school districts or legislation designed to provide students with compensatory education and adequate opportunities to learn (Crampton, 2001; Ferguson & Ladd, 1996; Minorini, 1994; Peevely, 1999; Verstegen, 1996; Vinik, 1996). The examination of these school indicators and profiles is not static, but is necessarily a continuous cycle as state, county and school demographics, state and federal programs, funding formulas, student testing programs, graduation requirements, teacher and administrator credentialling, and constraints of the state and county tax base may change from year to year (Ladd, 1998; Lockwood & McLean, 1997; Miller-Whitehead, 2001; "School finance: State efforts..., 1997; Verstegen, 2001; Wainer, 1993). Variables such as per pupil expenditure, class size, attendance, teacher salary, and other demographics reported on state report cards may be aggregated to the extent that their interpretations yield at best vague generalizations. As one study put it, "aggregation and the use of a single per pupil expenditure measure may obscure differential spending between grade levels or at different schools" (Fortune & Spofford-Richardson, 2000, p. 23). Some researchers imply that the process of determining just what goes into a particular state report card category may resemble attempts to replicate Colonel Sanders' famous recipe of eleven herbs and spices or the closely guarded secret formula for Cola. This is probably more true when making comparisons of indicators between states than for district to district comparisons within states. Compensatory

education pupil weighting formulas are often mandated by the state or federal programs that support them, although some states provide funding additional to that provided by the federal government for certain programs and some do not, for example in the area of bilingual education (Hussar & Sonnenberg, 2000; Riddle, 1992).

In an Alabama school funding case, a representative of the ETS (Educational Testing Service) pointed out that funding an extra $790 per pupil would pay 165 additional teachers or purchase 2,000 classroom computers, the implication being that these additional resources would have a direct positive effect on student achievement. The negative effect of poverty on student achievement has been well documented and has resulted in such compensatory programs as Title I, designed to aid students at the poverty level. The Alabama funding suit was the result of demonstrated disparites in adequacy of education from district to district, with Alabama ranked 22nd nationally in population but 43rd in disposable per capita income and 5th nationally in percent of population at the poverty level (Vinik, 1996). When outcomes can be ranked in terms of monetary units, cost benefit analysis (CBA) is often of interest to decision-makers who wish to determine how much it will cost to raise student achievement by a certain percent for a given population of students, although many educational and health care programs use non-monetary measures such as number of lives saved or quality of life and are thus evaluated by CEA or cost effectiveness analysis (Grissmer, Flanagan, Kawata, & Williamson, 2000; Nas, 1996).

Lockwood and McLean (1993) examined Alabama student achievement on the SAT9 using average daily attendance (ADA) to compute per pupil expenditure as a predictor variable of student achievement, pointing out that teacher salary was a less precise measure than per pupil

expenditure due to differential compensation for teachers of certain subjects or student populations. Depending upon the percent of teaching positions receiving differential compensation within a district, teacher salary might or might not be considered a proxy for teacher training and experience. Thus a finding that there is a relationship between teacher salary and student achievement could either be a correlate of higher pay for differential compensation or of teacher training and experience unless these variables are controlled for in the analysis. Conducting a series of regression analyses with predictor variable per pupil expenditure per ADA, Lockwood and McLean (1993) found that a curvilinear relationship between instructional expenditure and student achievement accounted for between 7% and 9% of explained variance in student achievement on the SAT9 subject area tests for grades 4 and 8. In a RAND study of cost effective correlates of student achievement, Grissmer et al. (2000) estimated that increasing student achievement by .10 standard deviation could cost from $200 to as much as $3,000 per child. According to the RAND report, Alabama's student achievement across 7 tests administered as part of the NAEP surpassed that of students in only 3 other states: Mississippi, Louisiana, and California. The choice of statistical model may also influence results of analysis of state report card data, particularly in nested models controlling for SES. While not within the scope of this study, it would be of interest to examine the effects of school and district simultaneously as two levels of a multilevel model (Galvin, Robins, & Callahan, 1998).

School size and school system size have also been identified as correlates of student achievement (Bickel & Howley, 2000; Gilbert, 2000; Lamdin, 1995). However, it is expensive to build schools and even more expensive to fund city school districts within a county, but as city

systems are created by referendum their existence is prima facie evidence of taxpayer support for funding them. Alabama has 67 counties and 128 school districts (all unified), with some counties having only a single county school district while other counties have both a county school district and as many as 10 city school districts. In 2000, the average Alabama school district had approximately 5,700 students with the largest district having nearly 66,000 students. Arkansas, on the other hand, where school district size was found not to be correlated to student achievement, had 311 districts with an average of 1,400 pupils each, the largest district having approximately 25,000 students (Gilbert).

Student achievement may also be affected by school and community initiatives that are exogenous to the district's formal budgetary or state reporting mechanism such as fundraisers, partnerships with business, and volunteer programs. City districts may be more successful than county districts in fundraising efforts (Golanda & Dagley, 1994). If this is the case then report card indicators may not be reflective of the entire spectrum of teaching and learning that takes place in the school (Bobbett & French, 1993; Bobbett, French, & Achilles, 1993; Fortune & Spofford-Richardson; McLean, Snyder, & Lawrence, 1998).

Data

School Districts

Table 1 provides descriptive statistics for the county district level variables used in the analysis and Table 2 for city district variables for comparison purposes.

Insert Tables 1 and 2 about here

As expected, aggregate student achievement on the SAT9 and the school district performance variables were highly correlated as they essentially measure student academic performance. Tables 1 and 2 show that the range of per pupil expenditure for city systems was greater than for county systems, with a maximum per pupil expenditure in county systems of $5181 and in city systems of $7119. The percent of school system funding derived from local revenue was also higher for city systems, with one city system reporting over 59% of funding from local revenue compared to a high of not quite 39% for county systems. Mean SAT average for city school systems was only 9 points higher than for county systems, although the highest SAT average for a city system was 22 points higher than that of the highest county system. There were significant positive correlations between percent of funding from local revenue, percent of faculty with advanced degrees, and student academic achievement for both city and county systems.

Insert Tables 3 and 4 about here

There were disparities between city and county systems in the correlation of per pupil expenditures with other variables as well as with percent of dropouts correlated to other variables.

Insert Table 5 about here

Table 5 provides the results of t-tests conducted to determine the extent to which differences between city and county systems were statistically significant and the 95% confidence interval of the mean for each variable. There were significant differences between city and county systems on all variables with the exception of percent of average daily attendance and percent of administrators with advanced administrative licensure.

Insert Table 6 about here

For purposes of this study, the dependent variable for used as the measure of student achievement was performance grade from the district and school report card, although data for SAT average is also provided. Performance grade and SAT average are highly correlated but not to the extent of multicollinearity or singularity. Although conducting separate regression analyses for city and county systems would have been of interest, for the purposes of this study regression models included data for all 128 city and county school districts. Table 6 provides comparisons of several of the regression models that were considered. Although all tested models accounted for approximately 80% of explained variability in the school district performance grade, not all variables proved to be statistically significant in the model even if the result of the F test for the regression model indicated that the regression model was significantly different from zero. As is

shown in Table 7, the optimized model (Model 3 from Table 6) included variables that met a selection criteria of $p < .05$. Table 7 displays the intercept, the unstandardized regression coefficients, and the standardized regression coefficients for the optimized model, $R = .80$, $R^2 = .64$, adj $R^2 = .63$, $F(4,123) = 53.69$, $p < .001$. Two of the variables, percent of students on free and reduced price meals and total enrollment, had a negative effect on district performance grade while percent of funding from local revenue and percent of administrators holding advanced licensure had a positive effect on school district performance grade.

The model resulted in the following formula for predicted school district performance grade:

Performance = 3.431 + .031(AA%) - .00001(Enrollment) - .024(Freemeal%) + .014(LocRev%)

Insert Table 7 about here

Schools

Since for the purposes of this study city and county schools were not examined separately the descriptive statistics for Alabama's public schools indicate a great diversity on all variables as shown in Table 8.

Insert Table 8 about here

School enrollments in Alabama public schools ranged from as few as 63 students to as many as 2724 students, with an average school enrollment of 558 students. Some schools had 100% of students qualified for free and reduced price meals and some schools had 100% average daily attendance while at other schools average attendance was a little more than 86%. Table 9 provides correlations for the school variables and shows that attendance was positively related to a school's achievement to ability comparison grade as well as to SAT average and performance grade. There was a negative correlation between school enrollment and percent advanced administrative licensure indicating that schools with more students were less likely to have administrators with advanced licensure, although all the correlations between faculty with advanced degrees and student achievement were positive at the school level. Schools with more students qualified for free and reduced price meals were also more likely to have higher percentages of faculty with BS degrees.

Insert Table 9 about here

Because of the amount of variability and diversity that exists in Alabama schools, school level regression models did not yield as high $\underline{R}^2$ as regression models at the district level. Table 10 shows variables included in three of the models tested at the school level. Although the results

of F tests indicated that the regression coefficients for Models 1 - 3 were significantly different from zero, Model 3 accounted for more variability in school performance than either Model 1 or Model 2 and each of the variables included in Model 3 was significant at $p < .001$.

Insert Table 10 about here

School level models yielded Rs between .63 and .67, with adjusted R^2s ranging from .39 to .45. The addition of ADA (average daily attendance) to the school level model resulted in both a higher R and adjusted R^2. The optimized regression model is provided in Table 11, with variable selection based on significance of $p < .05$. All variables were significant at $p = < .001$ for the optimized school model. Table 11 displays the intercept, the unstandardized regression coefficients, and the standardized regression coefficients for the optimized model, $R = .67$, $R^2 = .45$, adj $R^2 = .45$, $F(4,1256) = 255.51$, $p < .001$.

Insert Table 11 about here

The regression model for prediction of school level performance grade resulted in the following formula:

Performance = - 11.19 + .0073(MS%) + .152(ADA%) - .0003(Enrollment) - .021(Freemeal%)

Discussion

The results of examination of variables included on Alabama's Education Report Card showed that significant differences existed between city and county school districts in Alabama based on data from Report Card 2000. The analyses conducted provided a wealth of useful information but available variables were unable to explain much of the variability in Alabama's schools. Teachers' salary information was not included in the analysis although some researchers consider percent of faculty and administrators holding master's and doctoral degrees a proxy for salary. However, depending upon years of credited experience it is possible for an Alabama teacher with a bachelor's degree to have a higher salary than a teacher with a master's degree or 6 year administrative license and three years or less experience. Since data for some schools indicated that nearly all teachers had bachelor's degrees, it is unlikely that all were also beginning teachers. The probability is that many of these were teachers at the upper end of the experience scale. There was a negative correlation between student achievement and percent of teachers at the bachelor's degree level. There are various differential compensations depending upon teaching assignment that affect salary such that education level may not be reflective of an educator's actual salary.

Some of Alabama's school systems had high dropout rates and for both city and county school districts there was a positive correlation between students on free and reduced meals and percent of dropouts, with poverty level students in city systems more likely to have dropped out of school than students in county systems. There was a negative correlation between school district size and percent of dropouts for both city and county districts. However, there was a

disparity between city and county in both per pupil expenditure and in ability to achievement comparison grade when correlated to percent of district dropouts.

Some of the disparities between city and county school districts may have been the result of differences in allocation of funds and in participation in programs that are specific to the needs of city or county school districts. Percent of students at the poverty level had a negative effect on achievement at both district and school level.

Results of the analysis indicated that faculty education level had a positive effect on student achievement at both the district and school level that may or may not have been related to educator salary, that students in the largest districts and schools did not generally achieve as well as those in more average size districts and schools, that percent of funding from local revenue was positively correlated to student achievement at the district level, and that student achievement was positively correlated to school attendance at the school level. The negative correlation of student achievement to percent of teachers at bachelor's level suggests the need for continuing professional development or enrollment in advanced degree programs for experienced teachers at the bachelor's level, and for intensive mentoring programs for beginning level teachers with a bachelor's degree.

In conclusion, closing the student achievement gap may often depend upon the extent to which communities, funding agencies, and legislators choose to prioritize cost benefit or cost effective outcomes.

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Table 1

Descriptives for County System Variables, (N = 67)

Variable	Minimum	Maximum	M	SD	SE
AAC	4.92	5.41	5.15	.12	.02
AA %	.80	11.00	5.29	2.19	.27
ADA %	95.50	99.57	96.68	.63	.08
DROPOUT % '99	8.30	32.95	19.04	6.03	.76
ENROLLMENT	1669.00	65547.00	7270.00	9968.00	1217.80
PER PUPIL $	4516.70	6034.95	5181.20	315.66	38.60
FED REV %	3.36	24.70	9.92	3.97	.49
FREEMEAL %	20.06	95.00	55.28	19.23	2.35
LOC REV%	11.33	38.61	20.99	5.92	.72
PERFORMANCE	2.00	4.00	2.40	.52	.06
SAT	35.00	66.00	51.24	7.13	.87
BS %	32.90	61.80	45.90	7.01	.86
MA %	32.70	61.30	48.81	6.30	.77

Note. AAC is a computation of the school system's achievement to ability comparison. AA % is percent of administrators with 6th year program licensure. ADA is average daily attendance. SAT is average student achievement on the SAT9 based on state computation. BS% and MS% refer to percent of teachers with bachelor's and master's degrees.

Table 2

Descriptives for City System Variables, (N = 61)

Variable	Minimum	Maximum	M	SD	SE
AAC	4.87	6.22	5.32	.22	.03
AA %	.00	16.30	5.62	3.22	.41
ADA %	94.39	98.65	96.65	.77	.10
DROPOUT % '99	1.44	31.92	14.91	7.91	1.02
ENROLLMENT	673.00	38137.00	4017.87	5523.28	707.18
PER PUPIL $	4417.36	7119.33	5484.13	593.09	75.94
FED REV %	1.00	17.46	8.16	3.20	.41
FREEMEAL %	.00	91.98	41.88	18.42	2.36
LOC REV%	14.41	59.10	28.61	9.45	1.21
PERFORMANCE	2.00	4.00	3.00	.82	.11
SAT	40.00	88.00	60.00	10.35	1.33
BS %	26.60	63.60	41.60	8.49	1.09
MA %	36.30	65.90	52.78	7.60	.97

Note. AAC is a computation of the school system's achievement to ability comparison. AA % is percent of administrators with 6th year program licensure. ADA is average daily attendance. SAT is average student achievement on the SAT9 based on state grade scale. BS% and MS% refer to percent of teachers with bachelor's and master's degrees.

Table 3

Pearson's Product Moment Correlations for County System Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12
AAC	1.00											
AA %	.350**	1.00										
ADA %	.105	.120	1.00									
BS %	-.279*	-.461**	.071	1.00								
DROPOUT % 99	.021	.021	-.168	-.147	1.00							
ENROLLMENT	-.032	-.082	-.185	-.030	-.146	1.00						
PER PUPIL $	-.088	-.085	-.015	.181	.244	-.081	1.00					
FREEMEAL %	-.186	-.265*	.121	.462**	.105	-.319**	.459**	1.00				
LOC REV %	.247*	.206	-.228	-.323**	.110	.290*	-.073	-.661**	1.00			
MA %	.188	.165	-.121	-.951**	.160	.062	-.171	-.422**	.288*	1.00		
PERFORMANCE	.417**	.349**	-.098	-.300*	.084	.189	-.179	-.681**	.503**	.213	1.00	
SAT	.443**	.349**	-.100	-.473**	-.020	.269*	-.377**	-.901**	.647**	.404**	.813**	1.00

Note. * $p < .05$, ** $p < .01$

Table 4

Pearson's Product Moment Correlations for City System Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12
AAC	1.00											
AA %	.325*	1.00										
ADA %	.099	-.291*	1.00									
BS %	-.313*	-.451**	-.076	1.00								
DROPOUT % 99	-.380*	-.179	-.241	.099	1.00							
ENROLLMENT	-.002	-.069	.054	.193	-.079	1.00						
PER PUPIL $	.166	.277*	.090	-.288	-.276*	.157	1.00					
FREEMEAL %	-.533**	-.087	-.317*	.456**	.244	-.003	-.125	1.00				
LOC REV %	.396**	.041	.383**	-.310*	-.316*	.197	.543**	-.598**	1.00			
MA %	.212	.080	.208	-.926**	-.034	-.186	.204	-.472**	.329**	1.00		
PERFORMANCE	.664**	.205	.149	-.496**	-.325*	-.111	.112	-.811**	.513**	.467**	1.00	
SAT	.762**	.261*	.221	-.505**	-.363**	-.036	.238	-.898**	.621**	.453**	.901**	1.00

Note. * $p < .05$, ** $p < .01$

Table 5

T-Tests for Differences between City and County Systems, (N = 128)

Variable	t	Sig t	SE	95% Confidence Interval of Mean	
AAC	-5.606	.000	.031	-.2345	-.1121
AA %	-.689	.492	.483	-1.2900	.6235
ADA	.183	.855	.1243	-.2233	.2688
BS %	3.136	.002	1.372	1.5875	7.0164
DROPOUT % '99	3.266	.001	1.2643	1.6266	6.6328
ENROLLMENT	2.252	.026	1443.9886	394.9231	6110.145
PER PUPIL $	-3.652	.000	82.9490	-467.0798	-138.7725
FREE MEAL %	4.018	.000	3.3353	6.8015	20.0022
LOC REV %	-5.518	.000	1.3804	-10.3487	-4.8852
MA %	-3.225	.002	1.231	-6.4038	-1.5335
PERFORMANCE	-4.967	.000	.1202	-.8349	-.3592
SAT	-5.364	.000	1.56	-11.45	-5.28

Note. df = 126

Table 6

System Level Regression Models, (N = 128)

Models	R	R^2	Adj R^2	SE Estimate	F	Sig
Variables in the Models						
1 MA%, ADA%, Enrollment, AA%, LocRev%, Freemeal%	.799	.638	.620	.4562	35.49	.000
2 LocRev%, AA%, Systype, Freemeal%	.797	.636	.624	.4538	53.62	.000
3 LocRev%, Enrollment, AA%, Freemeal%	.797	.636	.624	.4536	53.69	.000

Note. Variables regressed on system performance grade for 2000.

Table 7

Summary of Optimized Model for Predictors of School System Performance (N = 128)

Variable	B	SE B	β
(Constant)	3.431	.284	
AA%	.031	.015	.113*
ENROLLMENT	-.00001	.000	-.126*
FREEMEAL	-.024	.003	-.657***
LOCREV%	.014	.006	.164*

Note. $R = .80$, $R^2 = .64$, adj $R^2 = .62$, $F(4,123) = .53.69$, $p < .001$.

Note. *** $p < .001$, * $p < .05$

Table 8

Descriptives for School Level Variables, (N = 1272)

Variable	Minimum	Maximum	M	SD	SE
AAC	3.5	6.54	5.24	.36	.010
AA%	.00	33.33	5.03	4.75	.133
ADA%	86.88	100.00	96.72	1.35	.038
BS%	.00	91.67	45.82	12.71	.356
ENROLLMENT	63.00	2724.00	558.33	296.38	8.310
FREEMEAL%	.00	100.00	49.80	24.67	.694
MA%	6.25	100.00	49.16	12.08	.339
PERFORMANCE	0.00	4.00	2.67	.84	.024
SAT	14.00	89.00	54.75	12.20	.340

Table 9

Pearson's Product Moment Correlations for School Level Variables

Variable	1	2	3	4	5	6	7	8	9
AAC	1.00								
AA%	.009	1.00							
ADA%	.327**	-.020	1.00						
BS%	-.121**	-.316**	-.037	1.00					
ENROLLMENT	-.150**	-.024	-.212**	-.067*	1.00				
FREEMEAL	-.107**	-.080**	.026	.271**	-.354**	1.00			
MA%	.123**	-.062*	.047	-.928**	.080**	-.253**	1.00		
PERFORMANCE	.613**	.037	.250**	-.272**	.068*	-.597**	.271**	1.00	
SAT	.661**	.065*	.262**	-.300**	.067*	-.665**	.290**	.927**	1.00

Note. * $p < .05$, ** $p < .01$

Table 10

Regression Models for School Level Variables, (N = 1260)

Models		R	R^2	Adj R^2	SE Estimate	F	Sig
	Variables in the Model						
1	AA%, ENROLLMENT, MS%, FREEMEAL	.63	.39	.39	.65	202.78	.000
2	ADA%, AA%, MS%, FREEMEAL%, ENROLLMENT	.67	.45	.45	.62	204.29	.000
3	ADA%, FREEMEAL%, MS%, ENROLLMENT	.67	.45	.45	.62	255.51	.000

Table 11

Summary of Optimized Regression Model for Predictors of School Performance, (N = 1260)

Variable	B	SE B	β
(Constant)	-11.19	1.305	
FREEMEAL	-.021	.001	-.614***
MS%	.00725	.002	.105***
ENROLLMENT	-.00029	.000	-.104***
ADA%	.152	.013	.244***

Note. $R = .67$, $R^2 = .45$, adj $R^2 = .45$, $F(4,1256) = 255.51$, $p < .001$.

Note. *** $p < .001$